In the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

89. (currently amended) A method of forming arrays of oligonucleotides on a solid support comprising:

providing a solid support having an array of positions each suitable for attachment of an oligonucleotide;

attaching to the solid support a surface or linker, suitable for coupling an oligonucleotide to the solid support, at each of the array positions; ~~and~~

forming ~~the~~ an array of a plurality of capture oligonucleotides on the solid support by a series of cycles of activating selected array positions for attachment of multimer nucleotides and attaching multimer nucleotides at ~~the~~ activated array positions; and

selecting the capture oligonucleotides to hybridize with complementary oligonucleotide target sequences under hybridization conditions such that said capture oligonucleotides bind to complementary oligonucleotide targets with a similar hybridization stability across the array.

90. (original) A method according to claim 89, wherein said forming comprises:

applying a multimer nucleotide along parallel rows of the solid support;

turning the support 90 degrees;

attaching a multimer nucleotide along parallel rows of the solid support to form oligonucleotides at row intersections having 2 sets of multimer nucleotides; and

repeating said applying, turning, and attaching until the oligonucleotides at the row intersections have 6 sets of multimer nucleotides.

91. (original) A method according to claim 89, wherein the solid support is made from a material selected from the group consisting of plastic, ceramic, metal, resin, gel, glass, silicon, and composites thereof.

92. (original) A method according to claim 89, wherein the solid support is in a form selected from the group consisting of slides, discs, membranes, films, and composites thereof.

93. (original) A method according to claim 89, wherein the solid support has an array of positions with the plurality of capture oligonucleotides having different nucleotide sequences.

94. (original) A method according to claim 93, wherein the solid support has wells, raised regions, or etched trenches.

95. (original) A method according to claim 94, wherein the solid support is in the form of a microtiter plate.

96. (original) A method according to claim 89, wherein said attaching a linker comprises:

silanizing a surface of the solid support.

97. (original) A method according to claim 89, wherein the solid support is functionalized with olefin, amino, hydroxyl, silanol, aldehyde, keto, halo, acyl halide, or carboxyl groups.

98. (original) A method according to claim 97, wherein the solid support is functionalized with an amino group by reaction with an amine compound selected from the group consisting of 3-aminopropyl triethoxysilane, 3-aminopropylmethyldiethoxysilane, 3-aminopropyl dimethylethoxysilane, 3-aminopropyl trimethoxysilane, N-(2-aminoethyl)-3-aminopropylmethyl dimethoxysilane, N-(2-aminoethyl-3-aminopropyl) trimethoxysilane, aminophenyl trimethoxysilane, 4-aminobutyldimethyl methoxysilane, 4-aminobutyl triethoxysilane, aminoethylaminomethylphenethyl trimethoxysilane, and mixtures thereof.

99. (original) A method according to claim 97, wherein the solid support is functionalized with an olefin-containing silane.

100. (original) A method according to claim 99, wherein the olefin-containing silane is selected from the group consisting of 3-(trimethoxysilyl)propyl methacrylate, *N*-[3-(trimethoxysilyl)propyl]-*N'*-(4-vinylbenzyl)ethylenediamine, triethoxyvinylsilane, triethylvinylsilane, vinyltrichlorosilane, vinyltrimethoxysilane, vinyltrimethylsilane, and mixtures thereof.

101. (original) A method according to claim 99, wherein the silanized support is polymerized with an olefin containing monomer.

102. (original) A method according to claim 101, wherein the olefin-containing monomer contains a functional group.

103. (original) A method according to claim 102, wherein the olefin-containing monomer is selected from the group consisting of acrylic acid, methacrylic acid, vinylacetic acid, 4-vinylbenzoic acid, itaconic acid, allyl amine, allylethylamine, 4-aminostryrene, 2-aminoethyl methacrylate, acryloyl chloride, methacryloyl chloride, chlorostyrene, dichlorostyrene, 4-hydroxystyrene, hydroxymethylstyrene, vinylbenzyl alcohol, allyl alcohol, 2-hydroxyethyl methacrylate, poly(ethylene glycol) methacrylate, and mixtures thereof.

104. (original) A method according to claim 101, wherein the support is polymerized with a monomer selected from the group consisting of acrylic acid, acrylamide, methacrylic acid, vinylacetic acid, 4-vinylbenzoic acid, itaconic acid, allyl amine, allylethylamine, 4-aminostyrene, 2-aminoethyl methacrylate, acryloyl chloride, methacryloyl chloride, chlorostyrene, dischlorostyrene, 4-hydroxystyrene, hydroxymethyl styrene, vinylbenzyl alcohol, allyl alcohol, 2-hydroxyethyl methacrylate, poly(ethylene glycol) methacrylate, and mixtures thereof, together with a monomer selected from the group consisting of acrylic acid, methacrylic acid, vinylacetic acid, 4-vinylbenzoic acid, itaconic acid, allyl amine, allylethylamine, 4-aminostyrene, 2-aminoethyl methacrylate, acryloyl

chloride, methacryloyl chloride, chlorostyrene, dichlorostyrene, 4-hydroxystyrene, hydroxymethyl styrene, vinylbenzyl alcohol, allyl alcohol, 2-hydroxyethyl methacrylate, poly(ethylene glycol) methacrylate, methyl acrylate, methyl methacrylate, ethyl acrylate, ethyl methacrylate, styrene, 1-vinylimidazole, 2-vinylpyridine, 4-vinylpyridine, divinylbenzene, ethylene glycol dimethacrylate, *N,N'*-methylenediacrylamide, *N,N'*-phenylenediacrylamide, 3,5-bis(acryloylamido) benzoic acid, pentaerythritol triacrylate, trimethylolpropane trimethacrylate, pentaerytrithol tetraacrylate, trimethylolpropane ethoxylate (14/3 EO/OH) triacrylate, trimethylolpropane ethoxylate (7/3 EO/OH) triacrylate, trimethylolpropane propoxylate (1 PO/OH) triacrylate, trimethylolpropane propoxylate (2 PO/OH) triacrylate, and mixtures thereof.

105. (original) A method according to claim 99, wherein said forming comprises:

photolithographically masking the solid support;

photochemically deprotecting the linker or outermost nucleotides attached to the solid support at unmasked array positions; and

adding nucleotides with a photoactivatable protecting group at photochemically deprotected array positions.

106. (original) A method according to claim 105, wherein the photoactivable protecting group is selected from the group consisting of nitroveratryloxycarbonyl, o-nitrobenzyloxycarbonyl, fluorenylmethoxycarbonyl, dimethyl-dimethoxybenzyloxycarbonyl, oxymethyleneanthraquinone, and mixtures thereof.

107. (original) A method according to claim 105, wherein the protecting group protects the nucleotides at their 3' or 5' ends.

108. (original) A method according to claim 105 further comprising:

washing the solid support after said photochemically deprotecting and said adding.

109. (original) A method according to claim 89, wherein the surface or linker is non-hydrolyzable.

110. (original) A method according to claim 89, wherein the solid support has an array of positions with the plurality of capture oligonucleotides having the same nucleotide sequences.

111. (original) A method according to claim 93, wherein each capture oligonucleotide differs from its adjacent capture oligonucleotide on the array by at least 25% of the nucleotides.

112. (original) A method according to claim 93, wherein each capture oligonucleotide is separated from adjacent capture oligonucleotides by barrier oligonucleotides which are shorter than the capture oligonucleotides.

113. (original) A method according to claim 89, wherein said method is carried out with a device having a plurality of chambers having separate valves on separate connections to a source of the multimer nucleotides and to a source of vacuum, said method further comprising:

orienting the device and the solid support for application of the multimer nucleotides to the solid support;

opening the valve to the source of vacuum to seal the chambers of the device against the solid support;

closing the valve to the source of vacuum;

opening the valve to the source of multimer nucleotides to supply the multimer nucleotides to the chambers for the attaching of multimer nucleotides at the activated array positions; and

closing the valve to the source of multimer nucleotides after the attaching.

114. (original) A method according to claim 113, wherein the device has the chambers separately along rows and columns of the array.

115. (original) A method according to claim 113, wherein the device has the chambers along rows of the array.

116. (original) A method according to claim 115, wherein the chambers are configured to deliver multimer nucleotides a precise column positions.

117. (original) A method according to claim 115, wherein said forming comprises:

applying a multimer nucleotide along parallel rows of the solid support;

turning the support 90 degrees;

attaching a multimer nucleotide along parallel rows of the solid support to form oligonucleotides at row intersections having 2 sets of multimer nucleotides by said opening the valve to the source of vacuum, said closing the valve to the source of vacuum, said opening the valve to the source of multimer nucleotides, and said closing the valve to the source of multimer nucleotides; and

repeating said applying, turning, and attaching until the oligonucleotides are formed at the row intersections.

118. (original) A method according to claim 113, wherein said device comprises a valve block assembly with plural input ports leading to sources of multimer nucleotides and plural output ports leading to chambers.

119. (original) A method according to claim 118, wherein the valve block assembly is cylindrical and has 2 adjacent rotatable portions which can be positioned relative to one another to connect selectively the input and output ports.